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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/044,526	01/10/2002	Ingo Hermann	H-205705	2860

7590 08/24/2004

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EXAMINER	
LEUNG, JENNIFER A	

ART UNIT	PAPER NUMBER
1764	

DATE MAILED: 08/24/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/044,526	HERMANN ET AL.
	Examiner	Art Unit
	Jennifer A. Leung	1764

S.C

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 May 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8 and 10-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8 and 10-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's amendment filed on May 20, 2004 has been received and carefully considered. Claims 9 and 20-30 have been cancelled. Claims 1-8 and 10-19 remain active.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-8 and 10-19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 1, it is unclear as to the relationship between "a catalytic coating" in line 7 and "a catalyst coating" in lines 11-12. Furthermore, "the coated plate(s)" in line 9 lacks proper positive antecedent basis.

Regarding claim 10, it is unclear as to the structural limitation applicant is attempting to recite by, "the air openings are provided at a location including at least one of in the spacers and between the spacers," in lines 3-4. (i.e., Is applicant attempting to recite a Markush group? Or are the air openings provided inside at least one of the spacers and between all of the spacers?).

Regarding claim 14, it is unclear as to the structural limitation applicant is attempting to recite b y, "a plurality of the structural elements comprises a fin shaped structure, a bar shaped structure, and a U-shaped structure," in lines 4-5. (i.e., Is applicant attempting to recite a Markush group? Or do the structural elements include all three structure types?).

Regarding claim 15, "the reactor gap" (line 5) lacks proper positive antecedent basis.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 2 and 11-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Furuya et al. (JP 06-111838).

Regarding claims 1, Furuya et al. (see section [0029] and FIG. 4) discloses an apparatus comprising:

at least two plates arranged essentially parallel to each other and at a distance from each other (i.e., see FIG. 4; thermally conductive segregant plates **17**), wherein the plates **17** form a reaction gap therebetween (i.e., comprising the space containing fluid passages **15**,**16**);

at least one of the plates **17** comprising structural elements being covered with a catalyst coating (i.e., see FIG. 5, 6; catalyst supports **12** defining the structural elements, and being covered with combustion catalyst **13** or reforming catalyst **14**), wherein the structural elements **12** extend into the reaction gap, and wherein the height of each of the structural elements **12** is less than the reaction gap (see FIG. 4).

As a result of the catalytic combustion of a fuel gas/oxygen mixture on combustion catalyst **13**, heat is generated and emitted via radiation, convection and conduction directly through the thermally conductive plate **17** to at least one neighboring endothermic stage (i.e., the reaction gaps containing fluid passages **16** and reforming catalyst **14**, for conducting an endothermic steam reforming reaction).

Regarding claim 2, Furuya et al. disclose at least one of the structural elements **12** comprises a four sided element (i.e., when constructed similarly to the embodiments of FIG. 7, 12, etc.), wherein the reaction gap provides an inlet (i.e., as illustrated in FIG. 4, at the right side of passage **15**) and an outlet (i.e., as illustrated in FIG. 4, at the left side of passage **15**) on the first and second opposite sides of the four-sided element so that the fuel gas/oxygen mixture flows in a flow direction from the inlet on the first side to the outlet on the second side.

Regarding claims 11 and 12, Furuya et al. (FIG. 4, 5, 6) discloses the surfaces of the plates **17** facing away from each other (i.e., facing towards fluid passage **16**) define the neighboring endothermic stage, wherein said surfaces of plates **17** are also structured with catalyst supports **12** and further comprise reforming catalyst **14** coated on the surfaces.

Regarding claim 13, in taking the embodiment of FIG. 12, for example, the inlet to fluid passage **15** (FIG. 4) inherently communicates with a feed channel for the fuel/oxygen mixture, arranged in an edge region on the first side of the element **12** and extending perpendicular to the reaction gap **15** (i.e., fuel/oxygen mixture being introduced through feed channel **61** located in an edge region on one side of the combustion plate **56**).

Regarding claims 14, 18 and 19, Furuya et al. discloses a plurality of structural elements **12** comprise a fin or bar shaped structure (see FIG. 5), or a U-shaped structure (see FIG. 6).

Regarding claim 15, as illustrated in the embodiment of FIG. 12, for example, the inlet to fluid passage **15** (FIG. 4) inherently communicates with several feed in passages which guide the fuel/oxygen mixture to different places in the reactor gap along the first side and thus assure a uniform distribution of the fuel/oxygen mixture over the width of the reactor gap (i.e., as shown, the rectangular inlet manifold in combustion plate **56**, which communicates with fuel/oxygen

inlet **61**, distributes the mixture uniformly across the width of the plate).

Regarding claim 16, as illustrated in the embodiment of FIG. 12, for example, the outlet from fluid passage **15** (FIG. 4) inherently communicates with several collecting passages which collect the exhaust gases from the reactor of the reaction gap at various places along the second side and feed the exhaust gases to the outflow channel (i.e., as shown, the rectangular outlet manifold in combustion plate **56**, which communicates with exhaust gas outlet **63**, collects the exhaust gas uniformly across the width of the plate).

Regarding claim 17, as illustrated in the embodiment of FIG. 12, for example, the feed-in passages (i.e., via the inlet manifold in combustion plate **56**, which communicates with fuel/oxygen inlet **61**) and the collecting passages (i.e., via the outlet manifold in combustion plate **56**, which communicates with exhaust gas outlet **63**) are rectangular and arranged side by side (see Figure), so that the distance in each case between a mouth of one of the feed-in passages and the inlet to the collecting passage lying opposite thereof is always the same.

Instant claims 1, 2 and 11-19 structurally read on the apparatus of Furuya et al.

4. Claims 1-3, 5-8 and 10-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Tawara et al. (JP 05-155602).

Regarding claim 1, Tawara et al. (FIG. 2-8, 10C) disclose an apparatus comprising:

at least two plates arranged essentially parallel to each other and at a distance from each other (i.e., septums **7**, shown as walls **100** in FIG. 10C), wherein the plates form a reaction gap therebetween (i.e., heating chamber **12**);

at least one of the plates comprising structural elements (i.e., as shown in FIG. 10C, "salients" **104**) being covered with a catalyst coating (i.e., catalyst **101** covers a portion of salient

104), wherein the structural elements **104** extend into the reaction gap, and wherein the height of each of the structural elements **104** is less than the reaction gap (see FIG. 10C). As a result of the catalytic combustion of a fuel gas/oxygen mixture (i.e., supplied via inlet **4**) on the catalyst coating (i.e., combustion catalyst **2**), heat is generated and emitted via radiation, convection and conduction directly through the plate 7 to at least one neighboring endothermic stage (i.e., reforming chamber **11**).

Regarding claim 2, Tawara et al. disclose that at least one of the structural elements comprises a four sided element (see FIG. 3), wherein the reaction gap **12** provides an inlet (i.e., fuel introduction line **4**) and an outlet (i.e., discharge line **6**) on the first and second opposite sides of the four-sided element so that the fuel gas/oxygen mixture flows in a flow direction from the inlet on the first side (i.e., the bottom side) to the outlet on the second side (i.e., the top side).

Regarding claim 3, Tawara discloses the reaction gap **12** being formed by plates of wavelike shape (i.e., see FIG. 10A; bent spacers **102**), wherein the peaks and valleys forming the longitudinal direction of the shape extend in the flow direction of the gases.

Regarding claim 5, Tawara et al. (FIG. 3, 4, 6, 8) disclose a device for introducing diluting air transversely to the direction of flow (i.e., the plurality of fuel feeding pipes **8** with nozzles **9**, for feeding gas in a direction transverse to the flow direction from inlet **4** to outlet **6**) provided at least in one place along at least one of the oppositely positioned third and fourth sides of the element (i.e., provided on the front facing side, as illustrated in FIG. 3 and 8).

Regarding claim 6, Tawara et al. discloses the device **8**, **9** introduces gas perpendicular to the flow direction of gas through the reaction gap **12** (i.e., best seen in FIG. 4, 8)

Regarding claims 7 and 8, Tawara et al. discloses the reaction gap/combustion chamber

12 comprises several structured sections (i.e., four structured sections, as defined by the shaded regions in FIG. 8) each being separated from one another by a region inherently free of structural elements (i.e., the unshaded regions containing pipes **8** with air openings **9** in FIG. 8).

Regarding claim 10, Tawara discloses the structural elements as shown in FIG. 10A-C define spacers (section [0014]), wherein air openings (i.e., in incorporating the fuel feed pipes **8** and nozzles **9** of FIG. 4 into the embodiment of FIG. 10A or 10C, for example) are inherently provided therein.

Regarding claim 11, Tawara et al. discloses plates **7** define an endothermic stage (i.e., reforming reaction chamber **11**; FIG. 3-7) on the side facing away from the reaction gap **12**.

Regarding claim 12, Tawara et al. disclose the sides of plates 7 facing away from reaction gap **12** comprise structural elements and a catalytic coating (i.e., reaction chamber **11** comprising structural elements as shown in FIG. 10C, sections [0014]-[0016], and reforming catalyst **1**).

Regarding claim 13, Tawara et al. discloses the inlet (i.e., fuel introduction line **4**) communicates with a feed channel arranged in an edge region of the first side, extending perpendicular to the reaction gap **12** (see FIG. 3 and 8, for unlabeled external inlet manifold communicating with line **4**).

Regarding claims 14, 18 and 19, Tawara et al. discloses a plurality of the structural elements comprises a fin or bar shaped structure (i.e., bars or fins as defined by walls of slots **104** or salients **104**; FIG. 10B, C), or a U-shaped structure (i.e., bent spacers **102**; FIG. 10A).

Regarding claim 15, Tawara et al. discloses the inlet (i.e., fuel introduction line **4**) communicates with several feed-in passages that guide the fuel/oxygen mixture over the width of the reaction gap **12** (see FIG. 3, 8, for external inlet manifold communicating with line **4**, which

feeds gas to fuel feed pipes **8**).

Regarding claim 16, Tawara discloses the outlet (i.e., discharge line **6**) communicates with several collecting passages that collect the exhaust gases from the reaction gap **12** at various places along the side (i.e., at four locations along the top side; FIG. 3), the collecting passages feeding the exhaust gas to the outflow channel (see FIG. 3, for external outlet manifold communicating with line **6**).

Regarding claim 17, Tawara et al. discloses the feeder passages (i.e., communicating with line **4**) and collecting passages (i.e., communicating with line **6**) are arranged side by side at equal distances from each other (see FIG. 3, 8), wherein the passages are inherently rectangular, as evidenced by the parallel plate 7 configuration.

Instant claims 1-3, 5-8 and 10-19 structurally read on the apparatus of Tawara et al.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tawara et al. (JP 05-155602, with machine translation) in view of Patel et al. (US 4,567,117).

Although Tawara is silent as to whether the wavelike shape **102** (FIG. 10A) may comprise a rectangular or square waveform, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select an appropriate waveform for the wavelike shape in the apparatus of Tawara, on the basis of suitability for the intended use, since changes in shape involves only ordinary skill in the art, and furthermore, the selection of rectangular or square waveform for a catalytic substrate is conventionally known in the art, as evidenced by Patel et al. (see FIG. 1; catalyst **12** coated on corrugated plate **2**).

Response to Arguments

6. Applicant's arguments filed on May 20, 2004 have been fully considered but they are not persuasive.

On page 7, second to last paragraph, Applicants argue,

> "The structural elements as now recited in claims 1, 14, 18-19, are not suggested by Furuya et al. At most, Furuya et al. discloses walls that extend from one plate to another."

The Examiner respectfully disagrees. As noted in the rejection above, the apparatus of Furuya et al. structurally meets the claims, based on a different interpretation of the reference. The embodiment is best illustrated in FIG. 4-6. As indicated in the translation, section [0029],

> "A laminating is carried out so that it may have *the space* which the catalyst side where a catalyst support is of the same kind... faces each other as composition of a reforming machine, and *serves as the fluid passage 15 and 16*."

Figure 4 illustrates the reaction gap, or *the space* comprising passages **15** and **16**, being located between plate walls **17**; thereby indicating that the structural elements as defined by the catalyst

support means **12** do not fully extend from one plate to the next. FIGs. 5 and 6 show a side view of the catalyst support means **12**, wherein the top edge of the structure comprises a squared or rounded shape, substantially defining a bar/fin or U-shaped configuration, respectively.

On page 7, last paragraph, to page 8, first paragraph, Applicants argue,

> "Tawara et al. does not suggest that spacer 102 be covered with a catalyst coating. Tawara et al. certainly does not suggest structural elements should have a height less than the reaction gap. Nor does Tawara et al. suggest the specific shape of the structural elements recited in claims 14, and 18-19. Tawara et al. does not suggest a burner element for introducing air perpendicular to the flow direction of the fuel gas/oxygen mixture as recited in claim 6."

On page 8, second paragraph, Applicants further argue,

> "Tawara et al. fails to disclose "a catalytic coating on at least one of the plates" and "structural elements being covered with a catalyst coating" as recited in claim 1... The combination of Tawara et al. and Patel et al. certainly does not suggest the specific shaped structural elements recited in claims 14 and 19-19. Tawara et al. and Patel et al. certainly do not suggest a burner element for introducing air perpendicular to the flow direction of the fuel gas/oxygen mixture as recited in claim 6."

The Examiner respectfully disagrees. By definition, to "cover" something is to place something upon or over. To be located "on" something is to be in contact with something. (The American Heritage ® Dictionary of the English Language, Fourth Edition). For example, FIG. 10C shows catalyst **101** *covers* structural element **104**, because the catalyst is placed upon and is in contact with a portion of the surface of the structural element **104**. Also, FIG. 10B shows that the catalyst **101** is located *on* plate **100**, because the catalyst is placed in direct contact with plate **100**. The catalyst **101** further comprises *a catalyst coating*, being that catalyst **101** is thinly deposited as a coating onto a substrate prior to being inserted into the reaction chamber (see sections [0010]-[0013]). Furthermore, as shown in FIG. 10C, the reaction gap is defined as the

total distance between left plate **100** and right plate **100**. Structural elements **104** clearly have a height less than the width of the reaction gap. The various shapes of a fin, bar or U-shape are further shown in FIG. 10A-10C. For instance, salient **104** is shaped as a fin or bar, and bent spacers **102** comprise a U-shape. Tawara et al. further discloses a burner element for introducing air perpendicular to the flow direction of the fuel gas/oxygen mixture. As shown in FIG. 8, inlet **4** defines a manifold that introduces air into the combustion chamber **12** at four separate vertical locations (i.e., at right side of the chamber). Thus, the diluting air is introduced to the chamber from right to left, as illustrated. Once the air enters the reaction chamber and travels through feed pipes **8**, the combusted fuel gas/oxygen mixture flows from its entry point at a respective nozzle **9** to the top of the chamber to exit via outlet **6**. Thus, the fuel/gas oxygen mixture flows from bottom to top, as illustrated.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Koga is provided to further illustrate the state of the art. The apparatus comprises a plurality of plates defining a plurality of alternate reforming chambers **Re** and combustion chambers **Co**, wherein the plurality of plates further comprise embossings **25** (FIG. 5) for preventing heat deformation of the plates.

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

The extension of time policy as set forth in 37 CFR 1.136(a) states that a shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing

date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

* * *

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is (571) 272-1449. The examiner can normally be reached on 8:30 am - 5:30 pm M-F, every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jennifer A. Leung
August 18, 2004 JAL

Hien Tran

HIEN TRAN
PRIMARY EXAMINER